

2002

Chief Inspector of Mines

Annual Report

Ministry of Energy and Mines
Mining Division

TABLE OF CONTENTS	PAGE
Foreword.....	2
1.1 Mine Health and Safety Function.....	3
1.2 Mining Administration Function: non-health and safety component.....	3
1.3 Land Use	4
2.1 Occupational Health Group.....	4
2.2 Mechanical Engineering, Electrical Engineering and Emergency Preparedness.....	5
2.3 Competitions and Awards	8
2.4 Examinations and Certifications.....	12
2.5 Accidents and Incidents	16
2.6 Summary of Mine Production.....	17
2.7 Volume of Inspections.....	18
3.1 Notices of Work.....	20
4.1 Reclamation	20
4.2 Geotechnical/Mining Roads	28

Foreword

The Chief Inspector of Mines is appointed by the Minister of Energy and Mines to administer the Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia.

The Chief Inspector of Mines is also the director of the Mines Branch which functions through a central office in Victoria and five regional offices: Cranbrook, Kamloops, Nanaimo, Prince George and Smithers, plus a satellite office located in Fernie. Personnel in each of the regional offices are generally comprised of a regional manager supported by diverse technical and administrative staff. The regional manager in the Cranbrook office is responsible for the satellite office in Fernie.

Information about the Ministry and copies of Ministry publications are available through the following options:

Ministry Web site:
www.gov.bc.ca/em

Queen's Printer Publications Index Web site:
www.publications.gov.bc.ca

Communications Division
PO Box 9324 Stn Prov Govt
Victoria, B.C. V8W 9N3
Phone: (250) 952-0606
Fax: (250) 952-0627

Crown Publications Inc.
521 Fort Street
Victoria, B.C. V8W 1E7
Phone: (250) 386-4636
Fax: (250) 386-0221
www.crownpub.bc.ca

Further information on the activities of the various mining companies can be found in the Canadian Mines Handbook published each year by Northern Miner Press Limited (604) 688-9908 or from each mining operation. In addition, you can contact the Mining Association of B.C. (604) 681-4321 and the Coal Association of Canada (403) 262-1544. Each issue annual reports on the status of those sectors.

1.1 Mine Health and Safety Function

MANDATE/ACTIVITIES

The Mines Branch function derives its mandate from the Mines Act and its accompanying Health, Safety and Reclamation Code for Mines in British Columbia (the Code).

The Code is reviewed on an ongoing basis, by the code review committee comprising representatives from labour, industry and government, and chaired by the Chief Inspector, to ensure it remains current with new technology, mining practices and health and safety concerns. The current edition of the Code was released in April 1997.

The key mandate of the branch, with respect to health and safety, is to ensure worker health and safety, and public safety. In order to accomplish this, the branch functions include:

- the review of health and safety related aspects of mining and exploration proposals;
- mine inspections and the close monitoring of mining activity for conformance with the Mines Act and Code, and the approval of mine plans with regard to health and safety concerns;
- the collection of data and maintenance of records with respect to accidents, dangerous occurrences, inspection frequencies and audiometric (hearing test) data; and,
- participation in research projects.

As part of the ongoing development of the Mines Branch, a system of managing Notices of Work, mine visits, and dangerous occurrences has been implemented to replace an old DOS system that failed during the year. The new system is known as the Mine Management System (MMS) and is being expanded and developed to include all of the branch functions associated with a mine and our visits to the mine. In 2002 inspectors began entering mine visits and dangerous occurrences. We also include variances into the system, to allow them to be managed.

1.2 Mining Administration Function - non-health and safety component

MANDATE/ACTIVITIES

The Mines Branch administers and regulates the full mining cycle, including exploration, development, production, reclamation and closure for metal, placer, industrial mineral and coal mines, and gravel pits and quarries. This mandate includes the review of applications and issuance of permits under Section 10 of the Mines Act for all mining activities including major mining projects subject to

the Environmental Assessment Act, establishment of geotechnical and reclamation standards and security levels, participation in regional and subregional planning, and in reviews of draft legislation and policies being developed by other agencies. Branch staff also provides guidance and assistance to companies and individuals exploring for minerals, and monitor exploration and mining activities in order to provide policy advice to government.

In addition to health and safety functions, branch inspectors address environmental and social sensitivities of proposed and permitted mines. The process for review of Mines Act permit applications includes consultation with other government agencies and affected stakeholders, including First Nations, to identify concerns to be addressed through site-specific permit conditions. Inspectors monitor mining activities to ensure compliance with these permit conditions and take enforcement actions if necessary.

2.1 Occupational Health Group

Roles and Responsibilities

The Health, Safety and Reclamation Code for Mines in B.C. (the Code) requires that mine managers develop a written occupational hygiene monitoring program. Larger operations in particular are required to establish procedures and to perform their own measurements of chemical and physical hazards to which workers were exposed in the workplace. This includes, among others, dusts, silica, respirable combustible dust, noise, gases and fumes, ionizing radiation and heat/cold stress.

The Occupational Health (OH) group provides its expertise in recognizing, evaluating and controlling these conditions as well as assistance in developing individual programs. In addition, the group makes comparative measurements to ensure companies follow proper methodology and obtain accurate results. Underground mine ventilation and workplace hazardous materials information system programs are also included in the group's responsibilities. Mine managers are also required to provide their occupational health and safety committees with training with respect to the prevention and reporting of musculoskeletal disorders. Such disorders include lower back pain, carpal tunnel syndrome and tendonitis.

The OH group was also involved in providing training to occupational health and safety committees at mines in these subjects.

STRUCTURE AND ORGANIZATION

During 2002 there were initially five people in the OH group, a manager, two industrial hygiene inspectors, an ergonomist and one administrative assistant. Unfortunately, the ergonomist returned to graduate school and due to fiscal restraint one industrial hygiene position was eliminated as of April 1st 2002.

SUMMARY OF ACTIVITIES

There were a wide variety of occurrences and situations in 2002 which required attention from the OH group, of note were:

- considerable concern by neighbours of smaller quarry and sand and gravel operations where dust and noise were involved, requiring a number of investigations; and,
- the review of several asbestos abatement projects during building renovations and demolitions at mine sites across the province.

In addition, the OH group:

- maintained, upgraded software, and input data to the Mines Branch audiometric database, which records the results of hearing tests that are undertaken at mine sites across the province.
- provided training courses for mines' industrial audiometric technicians; and
- provided training to mine safety personnel with respect to occupational health hazards and applicable occupational monitoring methods;

In addition to the above, OH inspectors conducted on-site inspections of mines to fulfill their mandate to monitor workplace conditions.

2.2 Mechanical Engineering, Electrical Engineering and Emergency Preparedness

ROLES AND RESPONSIBILITIES

Mechanical and electrical inspectors ensure that all mechanical and electrical equipment installed and used at mines complies with the Mines Act and the applicable codes and standards, and that the equipment is maintained in acceptable condition so that its operation causes no hazard to people or property.

The emergency preparedness inspector ensures that all mines have an emergency preparedness plan capable of being implemented at any time in response to any emergency occurring at the mine site. Emergency preparedness plans are integrated with a province-wide protocol that provides for aid and assistance from outside sources, to any mine experiencing an emergency, if required.

SUMMARY OF ACTIVITIES

Mechanical Engineering

In 2002 there were four staff in the Mechanical Group, one each in the Regional Offices of Prince George, Nanaimo, Fernie and in Kamloops. Inspections were carried out at all of the major mining operations, including the larger quarries and sand and gravel pits.

Several submissions of data pertaining to new or modified off-highway haul trucks were approved, and numerous minor modifications on various items of mobile equipment were also reviewed, with approvals issued in the majority of cases.

Delivery of new machinery and equipment to mines, together with the steady upgrading of much of the existing items, results in mines in British Columbia maintaining their competitive capabilities. At the same time, safety systems on new and upgraded equipment are usually enhanced, often as a result of new technology employed in such systems. The highly automated and complex control systems found on the equipment demands a high level of skill from those who operate and maintain the equipment. Branch staff involved in reviewing engineering drawings associated with the safety systems on such equipment, and subsequently having to perform field inspections on the items, endeavor to keep abreast of the many changes and innovations. In addition, inspectors, in collaboration with the mines, have to ensure that people operating equipment are aware of how equipment modifications may affect its operating functions, and ensure operators understand the consequences of failures occurring in installed control or sensing systems.

Audit Program

The safety audit program is designed to investigate how well a safety and health program has been implemented at a mine. A mine is visited by an audit team, consisting of between two and five staff members and a representative cross section of employees at the mine, who are interviewed, and an inspection is conducted of the records forming part of the safety and health program instituted by the company. Audit questions and record checks are based primarily on the requirements of the Mines Act and regulations pertaining to the health and safety of workers. Both the interviews and records checks enable the auditors to determine whether the program is well administered, and to determine how much knowledge employees have about how to perform their work tasks in a safe and healthful manner. When the on-site portion of each audit is completed, the information is analyzed and a report is issued to the mine manager who then discusses its contents with the occupational health and safety committee. Strengths and weaknesses of the program are highlighted in the report and a plan of action to improve the occupational health and safety program is

developed at the mine. Follow up of the implementation records checks enable the auditors to determine whether the program is well administered.

Electrical Engineering

During 2002 we had one electrical Inspector. Electrical inspections were conducted at all major mines including the larger sand and gravel operations as well as the smaller operations that demanded an in-depth electrical inspection. Most mines are still continuing to upgrade their electrical equipment and systems in order to increase efficiency and reduce power consumption costs.

Emergency Preparedness

This work was distributed among the district inspectors. Mine emergency preparedness plan guidelines and mine emergency management plans were established in 1991, first published in October 1992 and last updated in January 1997. The guidelines are distributed to the mining industry to use when setting up on-site preparedness plans. The management plans are distributed to proponents within the plan and are also for use by ministry staff.

Mine Rescue Stations

Regional mine rescue stations were consolidated in 1999. All mine rescue equipment is now located in a single centrally located station in Kamloops. The station is under the supervision of the Kamloops district inspector.

Mine Rescue Certifications

To qualify for mine rescue certification, mine employees must complete approved training and must pass written exams developed for various types of mining, as per Part 3 of the Health, Safety and Reclamation Code for Mines in British Columbia.

The Mines Branch is responsible for certifying miners in several categories of mine rescue, as listed below.

Mine Rescue Certificates issued in 2002:

Type	Number Issued	Re-certified
Underground mine rescue	23	46
Surface (open-pit) mine rescue	107	123
Gravel pit mine rescue	27	11
Total Certificates Issued	157	180

Mine Rescue Instructor Certificates issued in 2002:

Type	Number Issued
Underground	0
Surface (open-pit)	8
Total Instructor Certificates	8

2.3 Competitions and Awards

ROLES AND RESPONSIBILITIES

The primary mandate of the Mines Branch is to ensure worker health and safety, public safety and suitable reclamation and protection of the land and watercourses affected by mining and exploration work.

The Mines Act, and the Health, Safety and Reclamation Code for Mines in British Columbia stipulate the legal responsibility of provincial mining companies in meeting this mandate; however, many B.C. mining companies and their individual workers voluntarily and consistently exceed these legal requirements. Through the efforts of these individuals, companies and staff of the Ministry of Energy and Mines, mining is among B.C.'s safest heavy industries.

Mine rescue competitions, first-aid competitions, and safety awards all contribute to the overall climate of safety. Reclamation awards acknowledge those companies that go beyond what is called for in their mining plans, by conducting superior research and introducing innovative techniques to restore the land.

MINE RESCUE COMPETITIONS

The Provincial Mine Rescue competitions are judged by Branch mine inspectors and industry personnel who are responsible for all aspects of worker and public safety in B.C.'s mining industry. This year's competition was held in Smithers on June 15th.

Surface Mine Rescue Champions

The East Kootenay Zone competitions were held in Sparwood. The participating teams were as follows:

- Luscar Ltd. – Line Creek Mine
- Fording Coal Ltd. - Greenhills Operations
- Elkview Coal Corporation – Elkview Mine
- Fording Coal Ltd. - Coal Mountain
- Fording Coal Ltd. – Fording River Operation

The North / South Central Zone competitions were held in Smithers on June 13th. The participating mines were as follows:

North Zone

- Endako Mines Ltd. - Endako Mine
- Bullmoose Operating Corp. – Bullmoose Mine
- Northgate Exploration Ltd. – Kemess Mine

South/Central Zone

- Highland Valley Copper
- Mount Polley Corporation - Mount Polley Mine
- Ashgrove Cement Company – Blubber Bay Quarry
- Leigh High Cement - Texada Quarrying Limited

The first and second placed teams from each regional zone are eligible to compete in the provincial competition on June 15th , in Smithers. These teams are:

East Kootenay Zone

- Luscar Ltd. – Line Creek Mine
- Fording Coal Ltd. – Fording River Operations

North Zone

- Endako Mines Ltd. - Endako Mine
- Bullmoose Operating Corp. – Bullmoose Mine

South Central Zone

- Highland Valley Copper
- Ashgrove Cement Company – Blubber Bay Quarry

Provincial Competition Surface Mine Rescue Champions

The team from Highland Valley Copper won the 2002 surface mine competition and is the provincial champion. Team members were: Derrick Werring (Capt), Dale Konowalchuk (Vice-Capt), Neil Rideout, Susan Lavigne, John Brennan, Peter Dreschsler, Steve Hippisley (Spare), Gerry Wong (Coach).

Surface Bench Competition

The surface bench competition originated in 1995. The trophy is awarded to the surface mine rescue team that excels at the practical bench competition. The practical bench task is designed to test the individual team members on their knowledge and practical skills in mine rescue equipment and techniques. The competition is held in memory of Maurice Boisse, Mine Rescue Team Coach, Island Copper Mine. The award was won in 2002 by Highland Valley Copper

Underground Mine Rescue Champions

Three underground mine rescue teams competed in the provincial competitions in 2002 as follows:

- Homestake Canada Inc. - Eskay Creek Mine
- Quinsam Coal Corporation - Quinsam Mine
- Boliden Westmin (Canada) Ltd. - Myra Falls Operations

Boliden Westmin (Canada) Ltd. - Myra Falls Operations team won the underground mine rescue competition and are the provincial champions. Team members were: Rick Kretzschmar (Capt), Alan Day, Dayton Ostrosser, Nigel King, Rory McFadden (Vice-Capt), Joe Fic (Co-ordinator), Keith Notter (Spare), Wilf Penney (Coach).

Underground Bench Competition

The underground bench competition originated in 1978. The competition is held in memory of the late Barry Abbott, Captain of the Cominco HB mine rescue team who, in 1976, won the Canadian Championship. The award was won by the team from Boliden-Westmin - Myra Falls, Rick Kretzschmar (Captain).

Underground Bench Technician

The underground bench technician plays a very important role prior to and during a mine emergency. The Technician is responsible for the care, maintenance and servicing of the mine rescue teams' breathing apparatus. The underground bench technician task was prepared to test the technician's skills and competency at assembling and testing breathing apparatus. The bench technician competition was won by Ron Schofer of Cominco Ltd., Sullivan Mine.

First Aid Competitions

In the first-aid category there are two separate competitions; three-person first-aid competition; and the first-aid component of the underground and surface mine rescue competition.

Three-Person First Aid

The first provincial miner's three-person first-aid competition was held in 1978. The competition simulates accident situations - the local St John Ambulance Brigade and the BC Provincial Council design the problem, supply the judges, patients, props and medical supplies. After doing a short written exam the three team members render first aid. The St. John's standard course is the training standard, and only those who work in or about a mine are permitted to enter this competition.

This competition was designed as an extension of training for workers in basic first-aid skills, in order that they may assist their fellow workers at the face or at the work place in the event of an injury or medical emergency.

Competing teams at the provincial level were as follows:

- Ashgrove Cement Company – Blubber Bay Quarry
- Bullmoose Operating Corp. – Bullmoose Mine
- Elkview Coal Corporation – Elkview Mine
- Luscar Ltd. – Line Creek Mine
- Northgate Exploration - Kemess Mines
- Texada Quarrying Ltd.

The 2002 champion team was from Bullmoose Operating Corp. – Bullmoose Mine. The team members were Howard Basset, Rob Foy, Dave Foy and Kelly Parker (Coach).

First-Aid Component

The judging of the first-aid component is in conjunction with the provincial surface and underground mine rescue competition.

Underground First Aid

Cominco Ltd. introduced an award for the best first aid by an underground mine rescue team in 2001. In 2002 the award known as the “Sullivan Cup” was presented to Boliden Westmin (Canada) Ltd. - Myra Falls Operations.

The National Western Regional Competitions

To improve Canada's mine rescue mutual aid response capability, the national mine rescue committee, consisting of representatives from across Canada, has divided the country into three specific regions - East, Central and West. The rationale is based on the expediency of responding with teams and equipment from adjacent provinces and territories and to coordinate procedures within those jurisdictions.

The national western regional committee, consisting of representatives from Alberta, B.C., Saskatchewan, Northwest Territories, United States and the Yukon Territories, in conjunction with the city of Fernie (sponsor of the event), initiated underground and surface mine rescue competitions in 1993. The competitions are conducted on a biennial basis and serve to provide a medium for mine rescue teams to exercise their skills and to promote and coordinate an interchange of procedures and training standards.

The Fifth National Western Regional Mine Rescue Competition was held in 2001; the next is due in 2003.

The teams eligible to compete in 2003 will be the underground and surface mine rescue winners from the 2002 and 2003 provincial, territorial and United States competition events. Boliden Westmin (Canada) Ltd. - Myra Falls Operations and Highland Valley Copper will be eligible to compete in 2003.

Safety Awards Competitions

The presentation of awards at the 40th (2001) Annual Mine Safety Awards took place at the Harbour Towers Hotel in Victoria on Monday April 15, 2002. The results were reported in the 2001 report. The results of the competition for the calendar year 2002 will be presented in the 2003 report.

2.4 Examinations and Certifications

Section 26 of the Mines Act requires that every person employed at a mine, where required by the Code, be under the daily supervision of a person who holds a valid and appropriate certificate as required by the Code. The appropriate certification is specified in Part 1.12 of the Code. Recipients of a valid permanent certificate require re-examination every five years regarding their current knowledge of the Code.

Board Of Examiners

The Board of Examiners comprises the Chief Inspector of Mines as chair and other inspectors appointed by the Chief Inspector. During 2002, F.W. (Fred) Hermann chaired the board, with R. Booth, E. Mehr and J. Worsfold (administrator) as members. The board is responsible for examination of applicants for shiftboss certificates and certificates of competency, for considering applications for interchange certificates of competency, for issuing certificates and for conducting a review of all suspended certificates. The board is also responsible for administering blasting and supervisor certification.

Shiftboss Certificates

Seven different types of shiftboss certificates are issued:

- Open-pit
- Open-pit restricted (sand and gravel pit)
- Open-pit restricted (placer)
- Underground metal
- Underground restricted (crushing and conveying)
- Underground restricted (placer)
- Underground coal (Fireboss statistics included under certificate of competency)

A provisional certificate, which may be issued on a one-time basis, is valid for a period of six months.

An applicant for a shiftboss certificate must hold an appropriate blasting certificate (if blasting is carried out), a mine rescue certificate (surface or underground as required), and a valid first-aid certificate. The applicant must

also have obtained acceptable experience in and about a mine and pass a written examination on knowledge of the Mines Act and the Code.

Under Part 1.13.10(1) of the Code, a holder of a shiftboss certificate must revalidate every five years. This is accomplished by successfully writing an examination on knowledge of the Mines Act and the Code as well as holding valid appropriate supporting certifications (blasting, mine rescue and first aid).

Total Shiftboss Certification Activity 2002

Activity	New Certificates	Revalidation
Number of permanent certificates issued	28	63
Provisional certificates issued	21	0

Shiftboss Certificate Suspensions (Part 1.13.12 of the Code)

In 2002, there was one shiftboss certificate suspension.

1. Underground Certificate #OP 1446: Suspended for 90 days (March 6 – June 5, 2002), under Part 1.13.8(1) Health, Safety and Reclamation Code for Mines in BC. Part 1.13.8 states that a shiftboss certificate is valid only if the other certificates required by the code are enforce. Suspension of the blasting ticket automatically suspends the shiftboss certificate.
Reinstatement requirements: Automatic with Blasting Certificate, revalidation.

Certificates Of Competency

Managers and certain other supervisory officials at an underground coal mine, when required by the Chief Inspector must hold a certificate of competency.

Three types of certificates are issued:

- a first-class certificate which is required when 30 or more persons are employed underground;
- a second-class certificate which is required when fewer than 30 persons are employed underground; and,
- an underground coal fireboss certificate may be used if fewer than 10 persons are employed.

An applicant for a certificate of competency must hold the necessary academic certification, have obtained acceptable experience and must pass written examinations on mining practice and technology and on knowledge of the Mines Act and the Code. An interchange certificate may be granted to an applicant who holds an equivalent certificate granted by a jurisdiction outside the province, when they have proven their knowledge of the Code.

There were no new or revalidated first- or second-class certificates of competency issued during 2002. There were no recorded suspensions, cancellations or reprimands for either first- or second-class certificates of competency for 2002.

Total Underground Coal Fireboss Certification 2002

There were no new certificates, or revalidations, issued in 2002 for Permanent Certificates or for Provisional Certificates.

Supervisor Certificates

Every worker, other than those supervised by a shiftboss or the holder of a certificate of competency, and other than office employees, must work under the supervision of the holder of a supervisor certificate. Currently, four types of supervisor certificates are issued:

- Open-pit
- Sand and gravel or placer
- Underground
- Exploration

These four replace the previous 12 categories to better recognize that the workforce can, and does, move about the mine site. Where 12 workers or less are employed in a surface mine operation, supervision by the holder of a supervisor certificate, rather than the shiftboss certificate, may be acceptable.

An applicant for a supervisor certificate may be required to hold a valid first-aid certificate and must pass a written examination on knowledge of the Mines Act and the Code. A provisional certificate, which may be issued on a one-time basis by the mine manager, is valid for a period of six months.

Supervisor Certificate Statistics Activity 2002

In 2002 the number of Permanent certificates issues was 242. There were 75 Provisional certificates issued in 2002.

Blasting Certificates

Blasting certification is covered under Part 8.2 of the Code. Types of blasting certificates are:

- Basic
- Exploration
- Surface
- Underground
- Underground coal (Shotfirer)

- Electrical
- General-which includes all categories (except Underground Coal)

Blasting certificates do not have an expiry date. Provisional certificates can be issued for a period not exceeding 90 days. During 2000, 81 blasting certificates were issued.

Blasting Certificate Suspensions (Parts 8.2.6, 8.2.7 of the Code)

During 2002, there were four suspensions of blasting certificates.

1. #42587 Suspended one year (February 24, 2002 – February 23, 2003) For passing through an unguarded entrance to a pattern and failure to secured the entrance, which constituted an unsafe act, contravention of Part 8.3.9.

Reinstatement Requirements: Rewrite and successfully pass a blaster's examination.

2. #42593 Suspended for three months (March 6 - June5, 2002) Failure to follow Part 8.5.13 of the Code driving a vehicle within 8m of a charged blasthole.

Reinstatement Requirements: None stated

3. #42523 Suspended for two weeks (September 18, 2002 – October 3, 2002) under Parts 8.4.2 (1) - (7) of the Code for improper transportation of explosives.

Reinstatement Requirements: Rewrite and successfully pass a blaster's examination.

4. #40113 Suspended for 60 days (February 25 – April 26, 2002) under Part 8.2.7 of the Code for improper transportation of explosives in a unfit vehicle.

Reinstatement Requirements: None stated

During 2002, there was one cancellation of a blasting certificate.

1. #42512 Cancellation, contravention of Sec 8.3.9 of Code, failure to ensure a pattern adequately guarded or fenced. This resulted in vehicle entering the pattern and damaging a explosive product. This incident as well as a recent previous suspension resulted in cancellation of this certificate.

2.5 Accidents and Incidents

Dangerous and/or Unusual Occurrences

In 1999 the Ministry reviewed requests from the mines that we stop requiring the labour intensive MINACC to be filled in at the minesite, or that the MINACC be made compatible with their systems. To this end, the Ministry reviewed its computer needs, which resulted in a plan to develop the Mine Management System (MMS) to replace MIS (Mine Information System). This system was developed with a staged implementation starting with the replacement of the basic Mine Information System, then the peripheral systems that include MINACC, the incident module of the database. This implementation continued throughout 2000, and was expanded in 2001 to include all of the branch offices. In 2002 this module has continued to develop. The inspector has the responsibility to determine which incidents should be included. This has been influenced by workload and with staff reductions the Occupational Health and Safety Committee (OHSC) has been the primary incident investigation tool at a mine, with less involvement from the branch with consequently less incidents entered into the system.

The following accident information is produced from the MMS. The MMS was newly implemented in 2000 and the information presented represents all of the year 2002 as input by each office. The percentage is useful in that it may be compared to subsequent years as the system is developed.

LOCATION	COUNT	%
PIT	158	58.1
PLANT / MILL	26	9.6
MAINTENANCE (SHOP)	21	7.7
MAINTENANCE (FIELD)	13	4.8
HIGHWALL	5	1.8
DUMP	25	9.2
TAILINGS POND	5	1.8
OFFICE	2	0.7
DRY	1	0.4
UNDERGROUND GENERAL	6	2.2
UNDERGROUND FACE	3	1.1
UNDERGROUND OUTBYE / HAULAGE DRIFT	2	0.7

WORK PRACTICE	COUNT	%
EQUIPMENT FAILURE	103	38.0
INADEQUATE PLANNING	35	13.0
INADEQUATE MANAGEMENT	33	12.0
INADEQUATE EQUIPMENT	10	4.0
POOR WORK STANDARDS	33	12.0
ABUSE OR MISUSE	5	2.0
TRAINING	12	4.0
NOT FOLLOWING WORK PROCEDURES	46	17.0
OPERATOR ERROR	89	33.0
EQUIPMENT	COUNT	%
HAUL TRUCK	101	37.1
GRADER	7	2.6
LOADER	15	5.5
SHOVEL	24	8.8
DOZER	21	7.7
DRILL SURFACE	7	2.6
DRILL UNDERGROUND	0	0
PICKUP	17	6.3
LHD	1	0.4
CONVEYOR	5	1.8
ELECTRICAL	43	15.8
EXPLOSIVES	16	5.9
EXCAVATOR/BACKHOE	8	2.9
CRANE	5	1.8
FORKLIFT	3	1.1

GENERAL INFORMATION	COUNT	%
# OF PERSONS INVOLVED	387	
# OF PERSONS INJURED	53	
NEAR MISS	29	11.0
GEOTECHNICAL	21	8.0

* Note: Number of workers injured or involved is a sum of the amounts entered in these Dangerous Occurrences

All other Categories indicate a count of the Dangerous Occurrences where this category has been given a value.

2.6 Summary of Mine Production

The table below summarizes production and average employment at major British Columbia mine sites.

Statistics 2002¹

Coal Mines	Annual Rated Plant Capacity (Tonnes)	Actual Tonnes Produced	% of Capacity	Days Mill Operated	Average Employment	Contract Employment
Bullmoose	2,300,000	2,203,000	96	273	214	-
Elkview	6,000,000	5,547,000	92	265	716	-
Fording Coal Mountain	3,833,000	2,054,000	54	247	157	-
Fording Greenhills	4,500,000	3,780,000	84	255	375	-
Fording River	9,500,000	8,179,000	86	293	774	-
Line Creek	3,600,000	2,993,000	83	356	520	-
Quinsam Coal	780,000	508,000	65	245	48	4
Compliance Basin*	400,000	0	0	0	4	

Metal & Precious Metal Mines	Annual Rated Mill Capacity (Tonnes)	Actual Tonnes Milled	% of Capacity	Days Mill Operated	Average Employment	Contract Employment
Endako	10,950,000	9,641,000	88	355	215	3
Eskay Creek	91,000	116,000	127	365	151	103
Highland Valley	49,640,000	48,868,000	100	365	945	79
Huckleberry	7,665,000	7,422,000	97	314	215	-
Kemess	18,558,000	17,308,000	93	339	392	60
Myra Falls	1,460,000	774,000	53	275	376	-

* Mine is expected to open early 2003

2.7 Volume of Inspections

The Mine Management System (MMS) allows tracking of mine visits and the issuance of orders at mines. The following figures represent inspections performed by the Mining Operations Branch. When an inspector conducts a mine site inspection, the inspector passes on to other branches information they may need to attend to. Note the number of inspections is not an indicator of the relative volume of activity of each office. Some regions contain a few very large mining operations, whereas others contain hundreds of smaller operations. Therefore, the length of time to conduct an inspection varies from region to region.

¹ The Mining Industry in British Columbia – 2002 PricewaterhouseCoopers

While conducting 2,498 inspections during 2002, mines inspectors issued 3,060 orders and shut down 23 pieces of equipment. The following were recorded for 2002 in the MMS system which was introduced late in 2000:

Type	Inspections	H&S Orders	Equipment Shutdowns	Enviro. Orders	Dang.Occ.	Invest.	Training	Other
Abandoned Mine	9	7	0	0	0	0	0	(3)
Custom Mill	7	41	0	0	1	2	0	(1)
Coal-Surface	78	204	0	3	162	1	1	(16)
Coal-Underground	10	51	0	0	3	1	0	(4)
Exploration-Surface	179	204	1	118	46	0	3	(29)
Exploration-Underground	14	54	0	2	0	0	0	(2)
Industrial Minerals - Surface	118	240	0	39	11	2	3	(14)
Industrial Minerals-Underground	3	8	0	0	0	0	1	(0)
Metal Leach-Surface	0	0	0	0	0	0	0	(0)
Metal Mine - Surface	54	161	3	7	23	2	7	(9)
Metal Mine-Underground	66	307	1	24	10	1	1	(7)
Non Assignable/ Unidentified	2	3	0	0	0	0	1	(0)
Placer-Surface	182	118	3	162	0	0	0	(1)
Placer-Underground	1	0	0	0	0	0	0	(0)
Rock Quarry	102	172	0	31	1	2	1	(13)
Sand/Gravel Pit	672	928	15	176	7	1	10	(32)
TOTALS	1497	2498	23	562	263	12	29	131

3.1 Notices of Work

The following Notices of Work were entered into MMS in 2002.

TYPE	NOTICE OF WORK APPLICATIONS	PERMITS ISSUED	AVERAGE DAYS TO ISSUE
Mineral and Coal (Exploration)	286	169	35
Mineral and Coal (other)	76	50	43
Placer	503	169	37
Sand & Gravel	226	140	56
Total	1091	528	41

The breakdown of the 2002 Notice of work by area is as follows:

REGION	PLACER	SAND & GRAVEL	MINERAL AND COAL	TOTAL
Kootenay	33	36	67	136
Kamloops	34	50	57	141
Nanaimo	16	72	39	127
Prince George	321	48	108	477
Smithers	97	17	91	205
Other	2	3		5
Total	503	226	362	1091

The areas covered by the regions are as follows:

Southwest = Nanaimo, Lower Mainland and Vancouver Island areas

Central = Kamloops, Okanagan and Thompson areas

Kootenay = Cranbrook and Elk Valley areas

Northeast = Prince George, Omineca, Horsefly and Valemont areas

Northwest = Smithers, Skeena and Queen Charlottes areas

4.1 Reclamation

ROLES AND RESPONSIBILITIES

Reclamation and environmental protection are a major component of all mineral exploration and mine development activities in BC since 1969; mining companies have been required by law to reclaim all lands disturbed by mining. BC was one of the first jurisdictions in Canada to enact mine reclamation legislation, and the first to extend this policy to exploration sites. Reclamation and environmental protection are the responsibility of each mining company. Mining companies are required to obtain a permit approving the mine plan, the program for protection of the land and watercourses, and the reclamation program. Mining companies

must also place a security deposit with the province to ensure that the reclamation permit conditions are completed.

The environmental protection and reclamation objectives of the province's *Mines Act* and Code are to ensure:

- land and watercourses on mine sites in BC are reclaimed to a level of productivity equal to that which existed prior to mining;
- disturbed lands and water courses are re-integrated into the surrounding landscape;
- mining and mitigation requirements associated with metal leaching and acid rock drainage (ML/ARD) are conducted in a manner which prevents significant impacts to downstream or on-site biota and minimizes any reduction in post-mining productive capability of the site.

In order to achieve these objectives, the reclamation section:

- conducts detailed technical reviews of new projects or project revisions under the *Environmental Assessment Act*;
- conducts detailed technical reviews and issues permits for operating and closed mines with outstanding reclamation responsibilities under Section 10 of the *Mines Act*;
- inspects mine reclamation activity;
- administers reclamation security deposits on behalf of the provincial government;
- organizes a number of provincial committees and activities which conduct technology transfer, review Ministry practices, and enhance government/industry/public/academia cooperation, including the Technical and Research Committee on Reclamation, the Annual Reclamation Symposium, the Annual ML/ARD Workshop and the MEM Expert Advisory Committee for ML/ARD; and
- participates in national and international committees conducting research and technology transfer, including the mining industry's International Network for ARD Prevention (INAP) and the federal government's National Mine Environment Neutral Drainage (MEND 2000) Committee.

The reclamation section has expertise in the technical areas of soil restoration, re-vegetation, land capability, erosion control, geology, geochemistry, and metal leaching and acid rock drainage. Technical assistance is provided from within the Ministry on geotechnical and mining issues and by the Ministry of Water, Land and Air Protection (MWLAP) on biological and effluent discharge requirements.

STRUCTURE AND ORGANIZATION

The Reclamation Section is comprised of the manager, a senior reclamation agrologist, a senior reclamation geologist, a senior mine review geologist and one administrative staff located at headquarters. There are a total of four reclamation inspectors located in Cranbrook, Kamloops, Prince George and Smithers.

Summary of Activities

Permitting

The section enforces the reclamation provisions of the *Mines Act* through permit conditions and detailed technical reviews aimed at finding environmentally sound, economically viable solutions that enable industry to remain internationally competitive without compromising the province's rigorous environmental standards.

During 2002, permitting activity remained high. One new permit was issued to Crystal Graphite Corp. for the Black Crystal Graphite Mine, and 22 amendments were made to existing permits (Table 1).

Table 1: Summary of permit activity for 2002

Type	Amendments
Metal	15
Coal	4
Quarries	3
Total	22

Permit revisions were made at Huckleberry Mines Ltd., Kemess Mine, Sullivan Mine, Silvana, Britannia, Premier, Similkameen, Golden Bear, HB, Equity Silver, Afton, QR, Willow Creek, Quintette, Tulameen, Monteith Bay and Mt. Meager. Under the *Environmental Assessment Act*, reviews were conducted for Alberni Aggregates, Wolverine Coal, and Sea to Sky. The section also organized and participated on public committees reviewing activities at the Brenda, Quinsam, Equity Silver and Sullivan mines.

Cooperation and Consultation with Stakeholders

The section works closely with industry, other government agencies, First Nations and the public to inform them of our activities and ensure that all concerns are considered. For reclamation permits involving mechanical

disturbance of the land surface, applications are referred to other government agencies, the public, and First Nations where their interests are affected. The section provides regular assistance to MWLAP, MOT, Environment Canada, First Nations and the public on ML/ARD issues.

Cooperation facilitated by the reclamation section between industry, the public, government, and the academic community continues to result in a constructive climate for information exchange and dissemination of new technology.

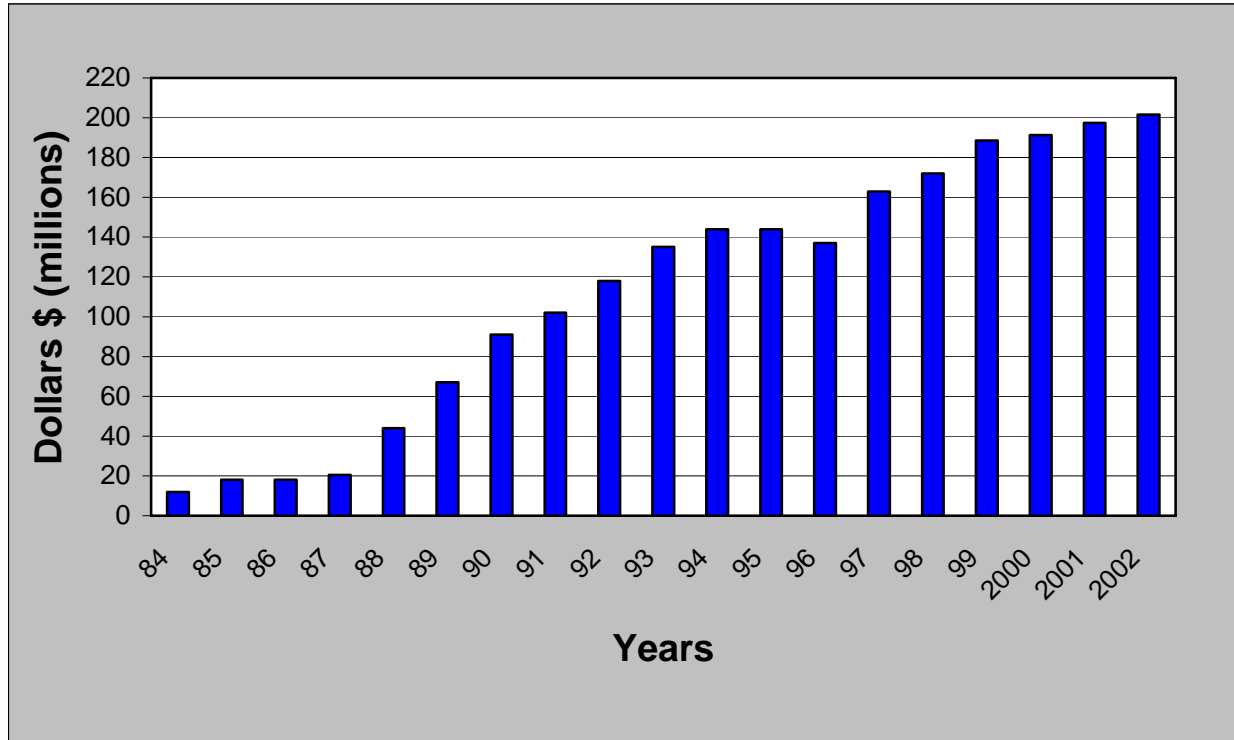
Metal Leaching and Acid Rock Drainage (ML/ARD)

The Ministry has produced a provincial ML/ARD policy, a more detailed set of ML/ARD guidelines, and a manual of recommended methods for the prediction of ML/ARD. These documents indicate what constitutes acceptable mine design and adequate technical evidence. They provide a checklist for industry and also inform the public of regulatory conditions and environmental protection requirements. The major ML/ARD activity in 2002 was mine review.

Reclamation Securities and Funds

All mines operating in BC must deposit security with the government to ensure that reclamation costs do not fall on provincial taxpayers (i.e., if a mining company goes bankrupt). In the past few years, the value of security deposits has increased to reflect more closely the true costs of reclamation. The total value of securities held by the province rose from \$10 million in 1984 to more than \$201.7 million by the end of 2002.

Reclamation Security Deposits Held by the Province of B.C., 1984 to 2002



Review of Contaminated Sites Policy

During 2002, Ministry staff continued to work closely with industry, environmental groups and the Ministry of Water, Land and Air Protection to resolve issues related to overlap of legislation between the *Mines Act* and the *Waste Management Act*. An independent consultant was hired to review the issue of environmental liability and provide recommendations on how best to ensure reasonable environmental protection and help contribute to a sustainable mining industry.

Mine Reclamation Symposium

The 26th Annual Mine Reclamation Symposium was held from September 9 to 13, 2002 in Dawson Creek, B.C. in association with the Canadian Land Reclamation Association, with a theme of "High Elevation Mine Reclamation." Delegates toured the Quintette and Bullmoose mines and were privileged to see an excellent and extensive program of reclamation. Reclamation sites visited included waste rock dumps at high elevations where 78 different native plant species had been collected, propagated and planted in the harsh high elevation alpine. The tour also included sites where more conventional revegetation using grass and legume mixtures had proved very successful, as well as other areas where reforestation was the primary land use objective.

The Annual British Columbia Mine Reclamation Award

The annual reclamation award, and up to five citations are awarded for outstanding achievement in mine reclamation and have been presented at the BC Mine Reclamation Symposium every year since 1977.

This year, the recipient of the 2001 British Columbia Jake McDonald Mine Reclamation Award was Teck Cominco Metals Ltd., for its excellent reclamation and remediation work at the Bluebell Mine.

The Bluebell Mine is located at Riondel on the shore of Kootenay Lake. The mine has had a long history starting in 1882. Two concentrators were operated at Bluebell from 1907 to 1927 and from 1952 to closure in 1971. This mine was not always operated under present day environmental standards. Following closure in 1971 the decommissioning and closure work was carried out to the satisfaction of the Ministry of Mines.

In 1997, on its own initiative, Teck Cominco assessed the site and developed a remedial action plan to improve the environmental and human health and safety aspects of the mine. Of particular concern were metal contaminated soils from ore and concentrate lying on land and in Kootenay Lake. Also, hydrocarbon contamination and unsafe mine openings required remediation. The bulk of the plan has now been completed, although sampling of soils and water continues.

The Bluebell remediation project was unique and challenging in many ways. Foreshore work required installation of primary and secondary silt curtains to contain sediment. The reconstructed Galena Bay beach was engineered to withstand wave action and to prevent redeposition of in-lake sediment. Diversion of a creek during work was required and the creek channel was reconstructed. Hydrocarbon contaminated materials were excavated and remediated on site. Many historic mine openings were identified, fenced and sealed. Finally, an aquatic assessment of metals bioavailability and toxicity in Galena Bay was carried out.

Throughout the reclamation project, Teck Cominco worked cooperatively with provincial and federal agencies and the people of Riondel.

Four citations were also awarded:

- Coal mine reclamation - was awarded to Bullmoose Operating Corp. for outstanding reclamation at the Bullmoose Mine.
- Metal mine reclamation - was awarded to Northgate Exploration Inc. for their exceptional reclamation efforts at the Kemess Mine.
- Sand and gravel reclamation - was awarded to Hub City Paving for their work at their Nanaimo Lakes Road Pit.
- Mineral Exploration reclamation - was awarded to Newhawk Gold Mines Ltd. for their work on the Hawk property.

Metal Leaching and Acid Rock Drainage Workshop

The 9th annual workshop was held in Vancouver on December 4 and 5, 2002. This year, the workshop focused on new developments, field results of biological and other non-traditional treatment methods, and the Britannia mine; a case study of collection and treatment..

Technical and Research Committee on Reclamation

This committee has been active in promoting and fostering reclamation research and information exchange for more than two decades. Members are drawn from the Ministry of Energy and Mines, Ministry of Water, Land and Air Protection, mining companies, the Mining Association of B.C., the University of B.C., and the Coal Association of Canada. This committee has been responsible for the organization of the annual B.C. Mine Reclamation Symposium for the past 26 years.

INDUSTRY RECLAMATION RECORD

The mining industry in BC currently consists of large-scale open pit metal mines, open pit coal mines, underground metal mines and one underground coal mine.

Since the late 1960's, land occupied by the mining industry has steadily grown. Major coal and metal mines, which occupied less than 1,000 hectares in 1969 had, by the end of 2002, expanded to cover 41,443 hectares. Reclamation (where revegetation has been successfully established for one year or more) has occurred on over 35 percent or 14,597 hectares (Figure 1).

Metal mines have disturbed 23,812 hectares, and 8,144 hectares (or 34 percent), have been reclaimed (Figure 2).

Coal mines have disturbed 17,631 hectares, and 6,454 hectares (or 37 percent) have been reclaimed (Figure 3). The sharp increase in disturbance and reclamation at metal mines during the late 1990's reflects the construction and development of three new mines at Huckleberry, Mt. Polley, and Kemess South and the closure and commencement of mine reclamation at others.

The data presented in Figures 1, 2 and 3 indicate that disturbance has been increasing at a faster rate than reclamation. This can largely be explained by the expansion of the mining industry during the past 30 years. Now that there has been a general industry decline, where mines are closing at a rate faster than they are opening, the rate of reclamation is starting to exceed the rate of disturbance.

Figure 1 - Land Disturbed and Reclaimed by Metal and Coal Mines in BC, 1969-2002

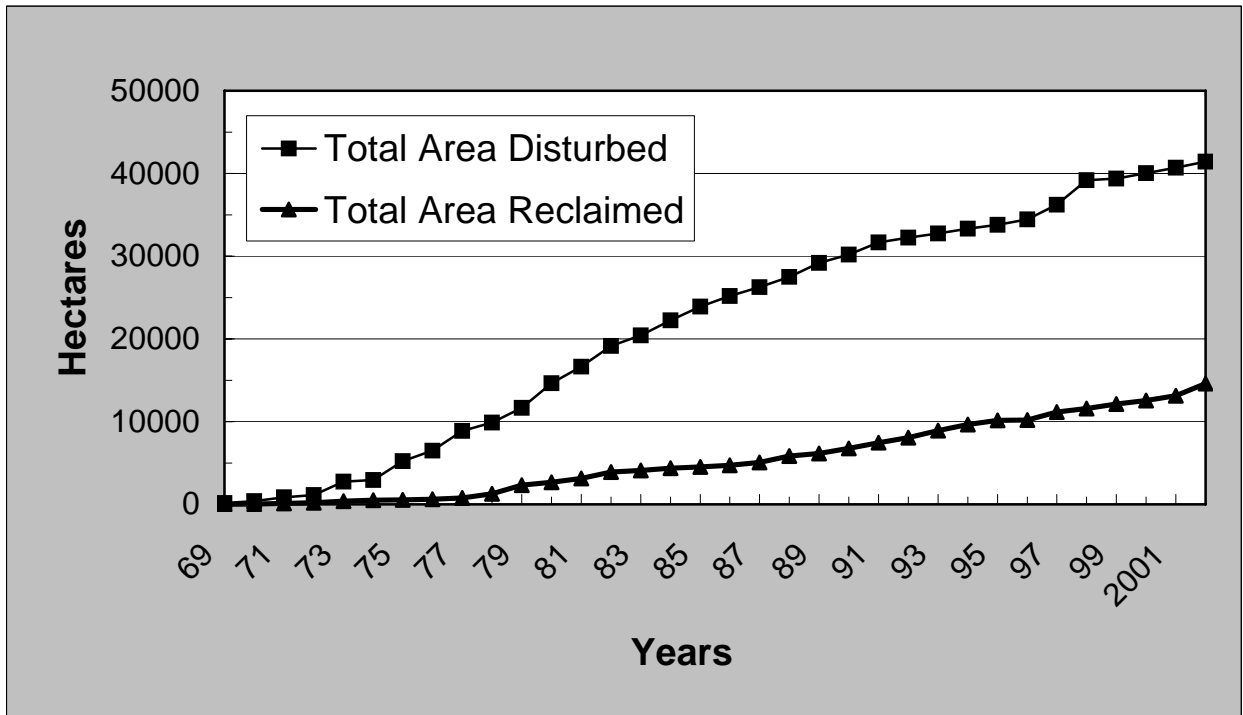


Figure 2 - Area Disturbed and Reclaimed by Metal Mines in BC, 1969 - 2002

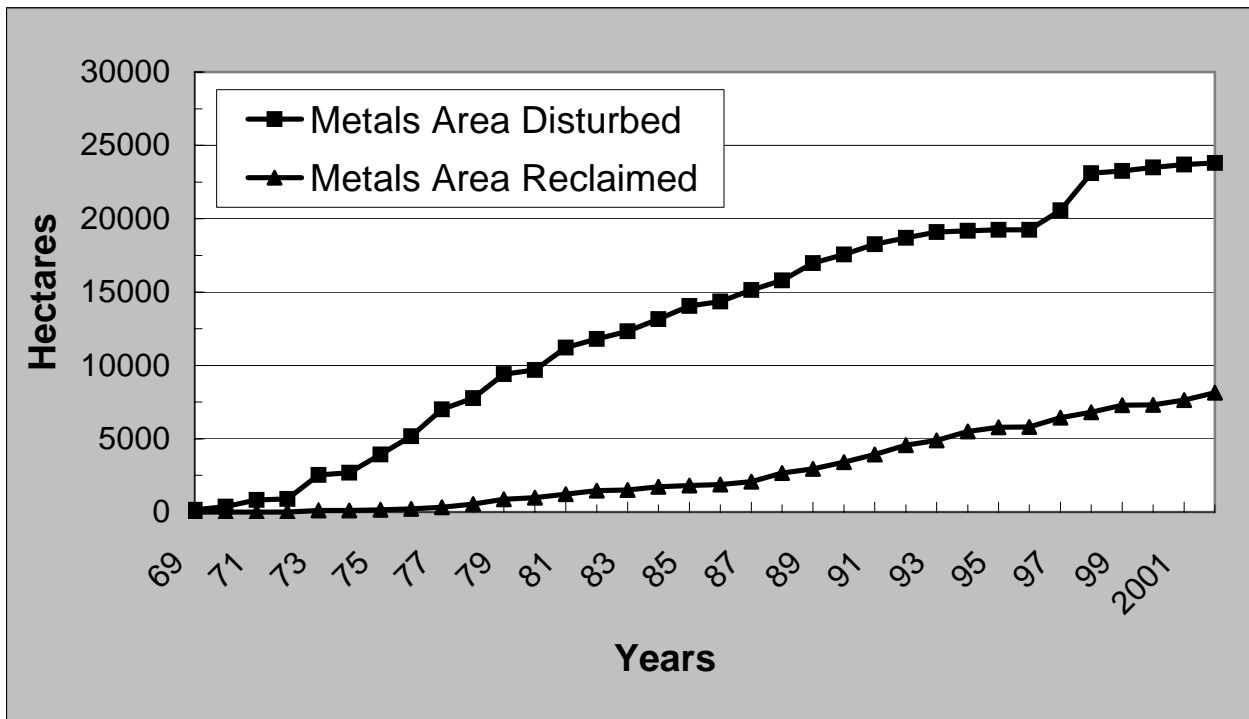
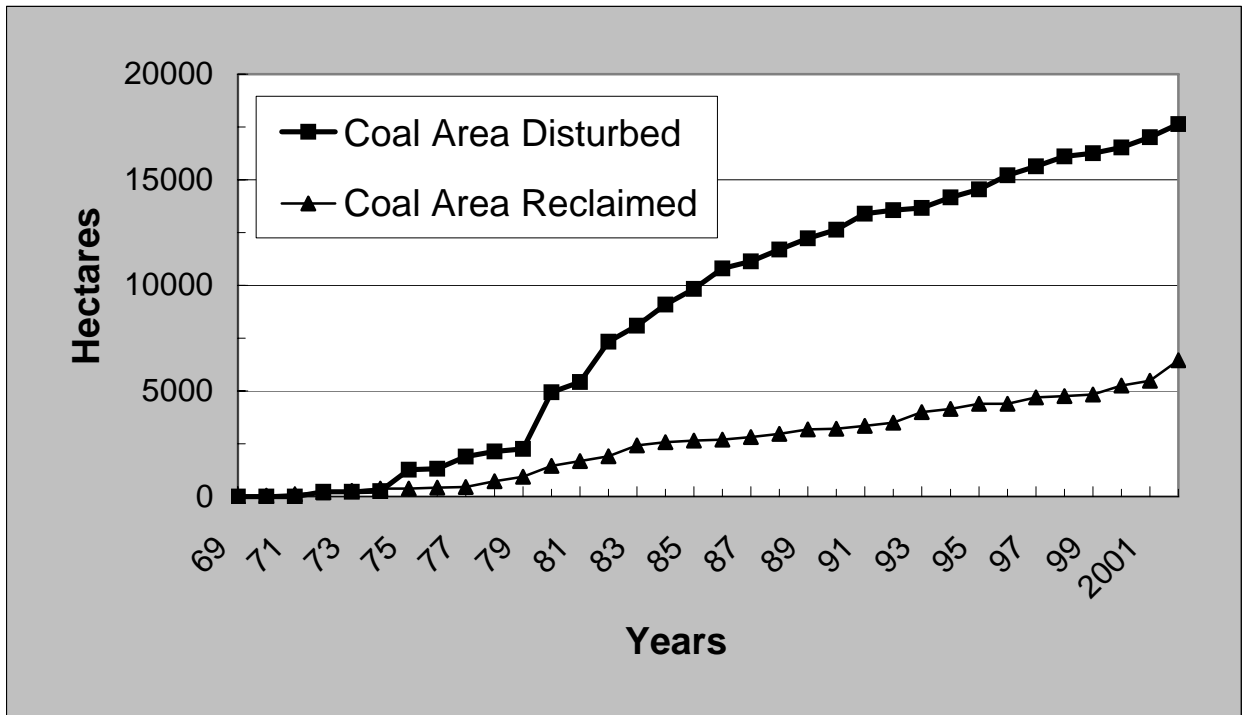


Figure 3 - Area Disturbed and Reclaimed by Coal Mines in BC, 1969 - 2002



4.2 Geotechnical/Mining Roads

ROLES AND RESPONSIBILITIES

The geotechnical section reviews mine designs for the project review stage of the Environmental Assessment Act process, as well as the application of the Mines Act under Section 10. Other duties include the inspection of major geotechnical works at mines, the assessment of geotechnical performance for worker protection and public health and safety, and for protection of land and watercourses.

The section provides in-house technical expertise and policy advice for:

- Tailings impoundments and dams, sediment control structures, waste rock dumps, soil overburden dumps;
- Open pit and underground rock mechanics;
- Roads, including route selection, standards and construction; and
- Risk evaluation for worker protection and public health and safety, and environmental impact of geotechnical projects.

ORGANIZATION

The section consists of a manager and an administrative assistant.

Summary of Activities Compliance and Work Systems

In 2002, the geotechnical section:

- Conducted a total of 17 inspections at metal, coal and other mine locations;
- Issued a total of 11 Mines Act permits or permit amendments to metal, coal and other mine operations approving major geotechnical structures;
- Provided advice and design requirements on numerous other smaller project referrals or requests.

Liaison, Committees and Special Assignments

The major activities for this section involved liaising with colleagues in regional offices, other branches, other ministries, the general public, consultants, mining company engineers and employees about work systems, compliance, incidents, guidelines and research.

Mining Roads

The section was active in answering queries about old mining roads, supplying information to government ministries and the general public.